and *O. pycnocarpa* and their hybrids, both of which species were formerly included in *O. biennis*. Many valuable confirmatory details need not be cited, but the following may be mentioned. The embryo sac is 4-nucleate, lacking antipodals and one of the polar nuclei, and this condition was found not only in *Oenothera*, but also in *Ludwigia*, *Gaura*, *Godetia*, and *Circaea*. The author regards it as a diagnostic character of Onagraceae, and therefore would exclude *Trapa*, with its normal 8-nucleate sac, from the family. This condition in Onagraceae he thinks may have been produced by mutation, but not by adaptation. The pollen tube enters the synergid and the "mixed plasma" flows out and spreads over the egg. The cytoplasm of the pollen grain was found to contain an immense number of minute starch grains, which migrate through the pollen tube, enter the synergid, and finally disappear. The male nucleus is inclosed in a distinct plasma sheath until it reaches the egg. The synergid and the upper two-thirds of the egg have a distinct cellulose membrane, the lower part of the egg acquiring it after fertilization. Self-sterility of some hybrids is said to be due to the feeble growth of the pollen tube.—J. M. C.

Histology of phloem.—There has been a tendency in recent years to assume that the doctrine of recapitulation is a law as valid and invariable as the laws of physics and chemistry, and to use it as a reliable short cut in the study of the evolution of plants. However, it is to be emphasized that a law is a statement of fact, not a theory or working hypothesis. If the doctrine of recapitulation and similar generalizations are to be accepted as true laws they must be capable of statistical or experimental proof. MACDANIELS[15] points out that, although in a considerable number of woody dicotyls which he studied there is no fundamental difference between the type of sieve tube found in seedlings and first annual rings and that found in the mature condition, the remaining forms possess a presumably less primitive type of structure in the earlier than the later stages of ontogeny. Furthermore, he shows that there is no close parallelism in the specialization of sieve tubes, vessels, and floral structures. It has been a common morphological fallacy to assume that because the evolution of a selected structure progresses apparently in a given direction the sums of all structures (organisms) are moving in a similar direction. MACDANIELS' comprehensive and painstaking piece of work is a valuable contribution to our knowledge of the histology of phloem.—I. W. BAILEY.

Enzyme secretion.—The influence of such inorganic salts as the nitrates, chloride sulphates, and monobasic phosphates of sodium and potassium, and the chlorides and sulphates of calcium and magnesium on the secretion of diastase by *Penicillium camembertii* has been investigated by ROBBINS.[16]

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[15] MACDANIELS, L. H., The histology of the phloem in certain woody angiosperms. Am. Jour. Bot. 5:347–378. 1918.

[16] ROBBINS, W. J., Influence of certain salts and nutrient solutions on the secretion of diastase by *Penicillium camembertii*. Amer. Jour. Bot. 3:234–260. 1916.

The general results show decrease in the amount of digestion of starch by the fungus in the presence of low concentrations (M/10,000 and M/100,000) of the chlorides and sulphates. The view is taken that the decreased digestion is caused by decreased secretion of diastase rather than by inhibition of the activity of secreted diastase. Potassium salts decrease secretion more than corresponding sodium salts. Experiments with nutrient solutions instead of single salts showed the same general effect, decreased secretion. No evidence was found to support the idea that calcium or potassium is intimately related to diastase formation. On the other hand, nitrogen may possibly have some relation to enzyme formation. Nitrates added singly increase the actual amount of starch digestion, but since the mycelial growth is much increased, there is really less digestion per unit of dry weight of mycelium.—C. A. SHULL.

Reaction of the medium and nitrogen assimilating organisms.—FRED and DAVENPORT[17] have studied the relation of the legume bacteria and *Azobacter* to low concentrations of acids and alkalies. When sulphuric acid was added to the nutrient solutions, the following hydrogen ion concentrations were found to be critical for the various legume organisms: alfalfa and sweet clover, P_H 4.9; garden pea, field pea, and vetch, P_H 4.7; red clover and common beans, P_H 4.2; soy beans and velvet beans, P_H 3.3; lupines, P_H 3.15. The authors believe a correlation exists between the acid resistance of the bacteria and the acid resistance of the higher plant with which they are associated. These organisms are not injured by normal alkali additions to the culture medium until the addition is about 10 times that of sulphuric acid producing injury. There seems to be little difference in the several strains as to the alkali resistance.

Azobacter is limited to a much narrower range of reaction than are the legume organisms, the critical limits being 6.5 P_H for acid and 8.6 P_H for alkali. It is to be regretted that the reaction was not determined by the gas chain as well as by the colorimetric method.—WM. CROCKER.

Transpiration.—DUGGAR and BONNS[18] have issued a third paper from the Missouri Botanical Garden on the effect of a film of Bordeaux mixture and other films on the transpiration of leaves. In potted mesophytes such a film increases generally the transpiration at night, but has less or no effect during the day. Similar behavior is shown by excised leaves. In *Cyperus esculentus*, a plant of xerophytic surface modification, such films have no effect on transpiration rate. The writers offer as tentative the following explanation: the film of Bordeaux mixture on the surface of a plant in a state of guttation acts more or less as a bibulous surface, taking water directly from the interior of the plant, through at least some continuous water channels

[17] FRED, E. B., and DAVENPORT, AUDREY, Influence of reaction on nitrogen-assimilating bacteria. Jour. Agric. Research **14**:317–336. 1918.

[18] DUGGAR, B. M., and BONNS, W. W., The effect of Bordeaux mixture on the rate of transpiration. Ann. Mo. Bot. Gard. **5**:153–176. 1918.